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# Risk Factors in Vendor-Driven IT Projects

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## ABSTRACT

There is strong 'official' sanction in the IT literature for the use of formal risk management processes for IT projects but there is a confused picture of their application in practice. While many potential risk factors for IT projects have been identified, we know less about which factors are actually attended to by project managers in the course of managing their projects, and little is known about which factors apply in different project contexts, such as in-house or out-sourced development, or package implementation projects. This paper reports on an in-depth exploratory investigation of vendor IT project managers in Hong Kong, and the key risk factors they attend to during software package implementation projects. A number of new context-specific risk factors are identified, and particular risks that are difficult to manage or anticipate are highlighted.

## Keywords

IT project risk management, software packages, risk factors.

## INTRODUCTION

Reports about problems with IT projects have appeared regularly in the popular and academic literature for over 30 years, including several well-publicized major failures (Drummond, 1996; Lyytinen, Mathiassen, and Ropponen, 1998). Risk management practice has been identified as one critical factor of the success of IT development projects (Boehm, 1991; Schmidt, Lyytinen, Keil, and Cule, 2001), and a significant stream of research has focused on identifying risk factors for IT projects in order to aid managers in making decisions about risk in their software development projects (see, for example: Alter, 1996; Barki, Rivard, and Talbot, 1993, 2001; Boehm, 1991; Keil, Cule, Lyytinen, and Schmidt, 1998). While many potential risk factors for IT projects have been identified, little is known about which of the many potential risks managers actually attend to in practice (Schmidt et al., 2001).

Software packages are especially interesting in the context of IT risk management practice, in that their use is purported to ameliorate or avoid many of the risks associated with custom developments (Lassila and Brancheau, 1999; Martin and McClure, 1983). With the trend away from custom system development towards generic software packages (Russo, 2000), interest in specific risk issues related to software package implementation projects is increasing (Parr, Shanks, and Darke, 1999; Sumner, 2000). And while it appears that these projects have some unique risks (Sumner, 2000), again there is little research addressing the particular practices of managers of these projects (Davis, 1998; Gable, 1998).

The research reported in this paper is part of a larger exploratory and descriptive field study of current practice in risk management of software package implementation projects. The aim of this section of the study was to explore how experienced project managers approach the task of managing risk in the implementation of software packages on client sites, and, in particular, to identify the key risks actually attended to by managers of package implementation projects, rather than simply extracting a list of all possible risks the managers might be able to nominate. These key risks were compared with factors identified in the literature both for custom development and for software packages in order to gain an understanding of current practice in terms of which risks are actively attended to and managed by project managers in specific projects.

## METHOD

The exploratory and descriptive nature of the research required research methods that met the need for contextual information, as the situation *contexts* were of paramount importance in gaining an understanding of the decisions made with respect to possible risks for a given project. Investigations of this type lend themselves to 'broadly interpretive methods of research' (Walsham, 1995a). Thus, a primarily qualitative analysis approach was used. The study used a critical decision interview approach (DuBois, 2002; Klein, Calderwood, and MacGregor, 1989) to explore and describe the risk management approaches used by experienced IT project managers during software package implementation projects.

## Participants and Projects

Twenty five experienced project managers participated in the research from twelve different organizations within Hong Kong. The organizations ranged from very small 'boutique' software houses, mainly focused on local clients, to Hong Kong branches of large multinational vendor and consulting firms and in-house IT departments in both commercial and government organizations. The project management experience of the respondents ranged from 3 to 30+ years, and 5 to 150+ projects. All of the respondents had trained or worked abroad for part of their careers, and all had experience working with team members from a wide variety of cultures. Nineteen of the respondents worked as project managers for vendor firms, while three worked as project managers of in-house projects outsourced to vendor firms. Responses from these in-house managers provided a client perspective on vendor-driven projects in order to confirm emerging differences between the vendor manager responses in this study and results reported in the literature from surveys of in-house respondents. The final three respondents held a project executive role in vendor firms, operating at a senior management level with several project managers reporting to them. These project executive respondents had all worked as project managers earlier in their careers, and were able to contrast these earlier experiences as managers with their current perspectives as executives.

The respondents described experiences with a wide variety of projects, ranging from small local projects with a team size of one to five people, budget of \$US20,000, and duration of three months, to very large, complex, multi-national projects with a budget of millions of US dollars, team size of 70+ people and a duration of more than two years. In total, since some of these projects were drawn from experiences earlier in their careers, the respondents discussed in depth 39 projects carried out by 25 different organizations.

Most (77%) of the clients in these projects were commercial organizations, with the remaining 23% being carried out for government and semi-government clients. Similarly, most (78%) of the projects were described from the perspective of the vendor firm, with 22% being discussed from the perspective of the in-house project manager. While most (65%) of the projects fell into a broad category of package implementation project, only two were described as straightforward implementations with little or no customization. More typically, the projects included extensive customization, front-end web development work, and/or major infrastructure upgrades. The remaining projects involved mainly custom development and some consulting work.

Finally, ten of the projects discussed by respondents were 'troubled' projects, which the managers had been called in to 'rescue'. These projects in particular revealed some key insights into what causes projects to go wrong, and the key steps needed to fix them.

## Coding and Analysis

The semi-structured interview method enabled the elicitation of specific risk factors actually identified by project managers during their risk assessment and risk management of projects. Interview transcripts were coded and analyzed with a qualitative content analysis procedure, using the software package NVivo version 2.0. It became clear from an initial overview of the transcripts that I needed to work with two different units of analysis. The project managers formed one level of analysis, but I also wanted to compare their responses on a project-by-project basis. Thus I set up two separate classifications of the transcripts in order to allow for an analysis of responses both by project manager, and also by project.

I began coding with an initial framework of 53 risk factors in 14 different themes drawn from the list compiled by Schmidt et al. (2001), since this is the most recent and arguably the most comprehensive list of risk factors in the literature. Where a risk factor identified by a project manager did not correspond to any of the items on Schmidt et al.'s list, I searched other previous studies (for example, Barki et al., 1993; Boehm, 1991; Moynihan, 1996; Sumner, 2000) for an appropriate category. Where none appeared, I created a new category. During this process, which resulted in a final list of 98 risk factors, grouped under 17 different themes, I encountered some difficulties in consistently applying some of the finer coding distinctions made by previous researchers, and I also found that respondents in this study regarded some risks as inseparable, even though previous researchers had separated these risks into clearly distinct risk areas. For example, in the funding and scheduling area, my respondents all regarded these risks as 'two sides of the same coin'. It also became clear that these respondents, managing vendor-driven projects, made distinctions that were not well catered for in the original framework. For example, they clearly distinguished between risks related to the vendor firms, risks related to the client and risks that related to any third parties involved in the projects.

As a result, I developed a new framework that better reflected the themes emerging from the particular set of project managers that I had interviewed. This new coding framework still drew on the codes I had previously identified from the literature, but now I condensed and amalgamated some factors and expanded categories in other areas in order to better match my respondents' perspectives. I used three overarching sets: vendor risks, client risks, and third party risks. Within these

three sets, I identified a total of 43 risk factors in five broad themes: relationships, project management, environment, technology, and solution. The full table of factors used in the new coding framework is shown in Table 1.

I recoded every transcript again using the new framework, without reference to the original coding framework. This detailed coding of all transcripts under two different frameworks provided the opportunity to assess the extent to which codes had been applied consistently since I could examine the extent to which coding references occurred at the intersections expected from a mapping of the original framework onto the new framework. The majority (81%) of coding intersections were as expected. Two thirds of the anomalies (12%) were spurious, due to overlapping caused by selection of slightly larger “chunks” of text during the second coding process. The remaining anomalies (7%) were all related to the coding problems with the original framework discussed earlier, and after reviewing each of these I was satisfied that the second framework had been consistently applied and better captured the intent of my respondents. While the final framework remains my own interpretation of the risks identified by respondents, the detailed coding and cross-referencing process described above minimized any biases introduced by my own perspective.

Finally, I distinguished up to three sets of risk factors within each project. For all projects, I identified the factors discussed by the project managers as potential problems when they first took over the project, and also those factors which became actual problems during the course of the project. In addition, ten of the projects discussed by the project managers were ‘troubled’ projects that the project managers had taken over or ‘rescued’ part way through the course of the project. For these ‘troubled’ projects, the project managers identified both the existing problems that had occurred prior to their taking over the project, and the potential problems they identified in their own risk assessment when they took over. They also discussed actual problems that arose during their management of the project.

## RESULTS AND DISCUSSION

The analysis focused on identifying the risk factors that respondents actually attended to in their projects, and comparing these factors with lists of factors identified in the literature. As noted above, the risk factors were analyzed both at the project manager level and also at the project level.

### Key Risk Factors at Project Manager Level

The teasing out of the risk factors into three different perspectives, namely risks situated with the vendor firm itself, risks associated with the client, and risks associated with any third parties to the project, resulted in the identification of several new risks, shown in bold in Table 1, that have not been previously recognized in the literature.

Theme	Set		
	Vendor	Third Party	Client
Relationships	<b>Team morale</b> <b>Internal negotiations</b> <b>Top management support</b>	Cooperation	Expectation <b>Trust</b> Top management support Users <b>IT department</b> <b>Bad news</b>
Project Management	Staffing resources Change management Schedule & budget Documentation	Staffing resources Deliverables control	Staffing resources Sign-off control <b>Readiness</b> <b>Project management</b>
Environment	<b>Reputation</b> <b>Overseas head office</b> <b>Competition</b> <b>Legal &amp; credit risk</b> <b>Contract terms &amp; conditions</b>	<b>Non-local 3<sup>rd</sup> party</b> Multiple 3 <sup>rd</sup> parties	<b>Multiple sites/countries</b> <b>Organization culture</b> Multiple departments Business changes
Technology	<b>Customization</b> Newness <b>Complexity</b>	<b>Integration &amp; compatibility</b>	<b>Data conversion</b> <b>Technical environment</b>
Solution	Development choice Requirements	Deliverables	Requirements Functionality

Table 1: Summarized risk factors

Most of the commonly used risk factor checklists appear to focus on in-house development (for example, Barki et al., 1993; Schmidt et al., 2001), and hence this distinction into three perspectives has not been made previously. In contrast, vendor and in-house managers in the present study distinguished risks arising from vendor, client and third party perspectives, suggesting that managers of out-sourced projects, both on the vendor and the client side, need to consider additional layers of risk not well covered in previous risk checklists. For project managers of vendor-driven projects it is very important to be clear about where potential risks arise from, since this may influence the strategy used to address the risk. For example, if a risk is identified with understanding requirements for the project it is important to be clear about whether this risk is associated with the understanding of the vendor project team, or the understanding of the client team, since different strategies are required to address these different situations.

Several of the new risks shown in Table 1 are particularly important for vendor project managers, and can be considered from the three perspectives noted above. Firstly, from the *vendor* perspective, vendor project managers have another layer of senior management to deal with and must be aware of risks from internal competition for resources, and from their personal ability to ensure adequate support from their own management for their projects. In addition, managers must be constantly vigilant for threats from their competition in the marketplace, and threats to their own firm's reputation. Secondly, from the *client* perspective, vendor project managers must be aware of potential risks related to contract terms and conditions, and the impact on future business for their own firms from poor performance by the client staff on the current project. Such client poor performance can be due to issues related to potential problems with the client IT department and their willingness to support an outsourced project, and general client readiness for the new system. Finally from the *third party* perspective, vendor project managers must consider risks arising from their own lack of familiarity with the detail of the client's technical environment. This last risk spills over into the *third party* perspective, in that if integration with third party products is required, the vendor project manager must address compatibility issues both between the third party product and the vendor product, and between the third party product and the client's existing technology.

An additional area of risks cut across all three perspectives and related particularly to the location of respondents in Hong Kong. A number of the projects described by respondents involved multiple country client locations or overseas third parties, or required significant interaction between the local project team and an overseas vendor head office. Each of these aspects, if present, was identified by respondents as adding an extra layer of potential logistical and communication risks to the project. It might be expected that these aspects have not been identified in previous research, since these studies typically appear to have been focused on in-house development within large organizations. However, it is surprising that the issue of working at multiple sites or branches within one organization has not been identified as a risk factor previously, since multiple site implementations within a single country are likely to be at risk from the same logistical and local variation issues that occur on a larger scale in multiple country implementations.

Some specific new technology risks identified in this study related to the focus on software package implementation projects, and while issues relating to new technology have been identified by previous researchers (for example, Schmidt et al., 2001), package-specific technology risks have received less attention, although there is some overlap with factors identified by Sumner (2000). For package implementation projects, two key new risks arise, namely the risk associated with the amount of customization to the product required by the client, and the risk associated with the complexity of the solution i.e. the number of different modules or functionalities to be implemented. Both of these risks cut across the vendor and client perspectives noted above, since project managers reported the need to negotiate with their clients to minimize the customization requirements, and with their own internal management for support to modify the package for any non-negotiable client requirements, and for support to quickly address problems that arose when unusual and potentially untested combinations of modules were required by a particular client.

#### *Risks Most Frequently Mentioned*

While respondents were not asked to rank factors in order of importance, the interview technique was designed to elicit specifically those risks that respondents thought important enough to attend to, rather than seeking every possible risk that they might consider. Thus a surrogate measure of risk importance can be inferred from the number of respondents identifying each factor as needing attention. The top 17 risks, each mentioned by at least ten of the respondents are shown in Table 2. Eight of the new factors discussed above (shown in bold in Table 1 and 2) were identified by at least ten of the respondents.

No direct comparison with risk rankings in previous studies is possible, because the present respondents were not asked to assess the importance of the factors they identified. However it is useful to compare the most frequently mentioned risks in the present study with the importance ratings from Schmidt and Keil et al.'s (Keil et al., 1998; Schmidt et al., 2001) Delphi study, since their risk factor list underpinned the coding framework for the present study. For the most part, the current respondents paid most attention to the same core risks that were identified in the Schmidt and Keil study. However two

results were surprising: Schmidt and Keil's number one factor, *lack of top management support*, does not appear among the top 17 factors of the present study; and the most frequently mentioned factor in the present study, *schedule and budget management*, does not appear in Schmidt and Keil's top eleven factors.

<b>Risk Factor</b>	<b>Rank (no. respondents)</b>
Schedule & budget management	1(22)
Client expectations	2 (18)
Change management	2 (18)
Client understanding of requirements	4 (17)
Vendor staffing	4 (17)
<b>Client trust</b>	6 (14)
Vendor understanding of requirements	6 (14)
<b>Vendor competition</b>	6 (14)
<b>Vendor team morale</b>	9 (13)
Newness of technology	9 (13)
<b>Client multiple sites/countries</b>	9 (13)
<b>Vendor legal &amp; credit risk</b>	12 (12)
Vendor documentation management	12 (12)
<b>Vendor contract terms &amp; conditions</b>	14 (11)
Third party deliverables	15 (10)
<b>Customization</b>	15 (10)
<b>'Bad news'</b>	15 (10)

**Table 2: Top 17 risks mentioned by at least ten respondents**

Previous literature appears divided over the relative importance of these two key risk factors. While some researchers (for example, Schmidt et al., 2001) rank the former risk, *lack of top management support*, as one of the most important, others (for example, Boehm, 1991) do not mention it, and rate the latter factor, *schedule and budget management*, much higher. A closer examination of the respondents and target reader audience in these previous studies suggested that Boehm's study might be aimed at the *operational* level of management, while Schmidt et al. may have captured more of a *strategic* management focus. This conjecture was supported by an examination of the contrasting comments of the three project executive respondents in the present study, who made clear distinctions between responsibilities appropriate at project manager level, and responsibilities at the executive level, with the issue of ensuring top management support being a project executive responsibility, while the project manager's primary responsibility was to manage the project schedule and budget. Similar findings have been reported in a comparison of IT executive and IT project manager roles in Norway (Karlsen, Gottschalk, and Andersen, 2002). Clearly more research is needed in this area to distinguish those risk factors that can be considered to be part of a project manager's focus from those that must be addressed at higher levels of the organization.

From a theoretical perspective, the prominence of the new risk factor, *client trust*, supports Sabherwal's (1999) contention that the issue of trust in out-sourced projects is particularly important since, unlike in-house projects, the customer and vendor parties have no prior relationship to build on. Inter-organizational projects typically involve both a psychological and a formal written contract between the parties (Ring and Van de Ven, 1994; Sabherwal, 1999), with the psychological contract being supported by the development of trust between the two parties. While managers working in collaborative relations can

cope in situations where trust is lacking (Vangen and Huxham, 2003), the emphasis placed on trust as a risk factor by respondents in the present study suggests that they saw the option of coping without trust as a much more difficult route.

### Key Risk Factors at Project Level

The results discussed above were drawn from an analysis of risk factors identified at the project manager level. I also investigated risks identified at the project level, using the 39 different projects that were discussed in depth by the respondents as a basis for this part of the analysis. In particular, I compared potential problems anticipated at the start of projects with problems that arose during those projects, in order to identify, firstly, those problems that most typically still occur in projects even if they have been anticipated, and, secondly, which of the problems that arise are most often unanticipated at the start. I examined the ten 'troubled' projects to identify the problems that their managers considered were responsible for the projects becoming 'troubled'.

#### *Problems Most Often Occurring Even After Mitigating Action*

As shown in Table 3, the most likely problem to arise, even after being anticipated and addressed with mitigating actions, was schedule and budget management, often compounded by the second and third most common problems of vendor staffing issues and difficulties arising from the newness of technology. All three of these problems were seen by respondents as having their underlying cause in inadequacies in the pre-sales analysis, resulting in either an overall shortfall in budget or time allowance, or in an underestimation of the skill-set required or of the extra work involved in coming to grips with new technology. On the surface, it might not seem so surprising that managers would try to shift the responsibility for problems in their projects away from themselves. However, there was a strong consensus among respondents that the issue of over-selling or over-promising was almost endemic in the industry, with the pressures to win business, and the desire to satisfy customers often outweighing more cautious responses to client requests for proposals. Indeed, respondents were honest about their own tendencies to present the 'best picture' when they themselves had been involved in pre-sales work.

<b>Risk factor</b>	<b>No. of projects in which problem was anticipated (out of total 39)</b>	<b>No. of projects in which problem still arose despite mitigating action</b>
Schedule & budget management	24	8
Vendor staffing	16	5
Newness of technology	12	5
Multiple sites; multiple countries	11	1
Vendor understanding of requirements	9	0
Client expectations	8	3
Client organization culture	7	4

**Table 3: Problems most likely to happen even after being anticipated**

#### *Most Common Unexpected Problems*

Given this tendency to 'paint a rosy picture' to clients at the start of projects, it is not surprising that the most common unanticipated problems tended to be client relationship problems. Client relationship problems appeared unlikely to be expected at the start, partly because signs that such problems might occur are typically not evident early in the vendor-client relationship, and also because their intangible nature makes them difficult to quantify and assess. However, the frequency with which client relationship problems did occur supports the need for strong measures to build good relationships at the start. Key unanticipated problems are shown in Table 4.

Risk factor	No. of projects in which problem occurred unexpectedly (out of total 39)
Client trust	12
Client expectations	9
Vendor team morale	8
Change management	7
Client understanding of requirements	6
Client project management	5
Client 'bad news'	5

**Table 4: Problems most likely to arise unexpectedly**

### Troubled Projects

The six problems most often highlighted in the 'troubled' projects were a combination of the most often anticipated problems and the most common unanticipated problems, with *client expectations* featuring highly in all three areas. The prominence of *client expectations* in all three problem sets is particularly significant. Customer satisfaction is related not only to what has been delivered and how well the process went, but also to what was expected in the first place. Indeed, disconfirmation of expectations, i.e. the difference between outcomes and expectations, is strongly positively correlated with customer satisfaction, as noted by Szymanski and Henard (2001) in their recent meta-analysis of customer satisfaction studies. What this means is that if expectations are high to start with, and the outcomes are not quite as high as those expectations, then customers will ultimately be dissatisfied, even if final functionality and performance is a good match with requirements. As Szymanski and Henard comment, "negative ramifications ... can result when firms overpromise and under-deliver". Customer satisfaction is obviously extremely important for vendor firms since it has a major impact on their reputation and can significantly influence future business, particularly since new clients are likely to ask for reference sites when assessing vendor bids (Russell and Chatterjee, 2003).

### CONCLUSIONS

The purpose of this research was to learn more about the risk factors actually attended to by managers of software package implementation projects. A number of new risk factors applicable in the vendor-driven context of package implementation projects have been identified, and risks that are particularly difficult to manage, such as *schedule and budget management*, or difficult to anticipate, such as *client trust* and *client expectations*, have been highlighted. The investigation into risk factors suggests a possible explanation – the strategic versus operational perspective of respondents -- for the contrasting views found in previous research on the relative importance of two key risk factors, *lack of top management support* and *schedule and budget management*. More research is needed in this area to distinguish between those risk factors under the control of the project manager, and those that must be addressed at higher levels of the organization.

While this study provides a foundation for a better understanding of those risk factors that are considered important by managers of vendor-driven IT projects, it also raises new questions. For example, while the location of this study in Hong Kong may be considered to be a limitation it also represents an important broadening of our perspective on IT project management into a more global arena. With the increasing trend towards globalization, and more multinational companies operating across traditional boundaries, more investigation is needed into the additional risks, such as *client multiple sites/countries*, that arise when working in different locations, with different languages, and different cultures. Similarly, while this research was limited mainly to software package implementation projects, these projects share many features in common with custom development projects and a future research opportunity is to explore the extent to which the findings from the present study are applicable in other IT project settings.

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